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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/971,721	10/04/2001	Otto Lenherr	4780-19	3049

7590 06/05/2007

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EXAMINER	
DANIELS, MATTHEW J	

ART UNIT	PAPER NUMBER
1732	

MAIL DATE	DELIVERY MODE
06/05/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	09/971,721	LENHERR, OTTO
	Examiner	Art Unit
	Matthew J. Daniels	1732

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 February 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *26,31-37,45-48,52-54 and 63-66* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *26,31-37,45-48,52-54 and 63-66* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicants' amendment filed August 4, 2006 has been entered. Claims 26, 31-50, 52-66 are pending in the instant application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 26, 31-37, 45-48, 52-54, 63-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 5,045,251) in view of JP 61-016817.

Johnson ('251) teaches the basic claimed process of molding a hollow fiber composite structure having a hollow undercut including, wrapping a wax core with fiber material to form a wrapped assembly, manufacturing a fibre preform in a shape fitting the fibre-reinforced component (col. 1, lines 25-27, col. 2, lines 47-68), placing the preform and supporting core into a mold cavity, injecting a resin into said mold cavity to impregnate said fiber material, curing (hardening) said resin to form a hardened structure and melting out said wax core to form said hollow fiber composite structure (see col. 6, lines 34-62 and, col. 8, lines 17-24 and 43-47). Further, Johnson ('251) specifically teaches removing the wax core after curing by melting said core, hence teaching that the melting temperature of the wax core is higher than the injection/curing temperature of the resin because if the melting temperature were lower, than the

core would melt/deform prior to curing which is in contradiction to the specific teachings of Johnson ('251) (see col. 8, lines 14-25). Hence, it is submitted that when using a wax core in the molding of a fiber reinforced component the deformation temperature of the core must be at least equal to or higher than the injection temperature of the resin matrix in order that said core maintain its geometric integrity. If the deformation temperature is lower, then the core will loose its geometrical integrity and as such could not be used during the molding process to form said fiber reinforced component.

Regarding claims 26 and 31-37, although Johnson ('251) teaches forming a wax core having a desired configuration, Johnson ('251) does not teach forming said wax core by plastic deformation of a cast wax preform at a temperature less than the melting temperature of the wax. JP 61-016817 teaches forming a paraffin wax (natural wax) article by compression molding (plastic deformation) of a solid core wax preform (15) at a temperature of 40-80% of the melting temperature of 63 ^{O}C, which is calculated to be 25.2-50.4 ^{O}C. It is submitted that a solid core wax preform must have been previously cast in order to be a solid core wax preform. Therefore, it would have been obvious for one of ordinary skill in the art to have used compression molding (plastic deformation) of a solid core paraffin wax preform (natural wax) at a temperature of 25.2-50.4 ^{O}C as taught by JP 61-016817 to form the wax core in the process of Johnson ('251) because, JP 61-016817 teaches that compression molding provides for an improved product by avoiding shrinkage and also because, Johnson ('251) specifically teaches forming a solid wax core having a desired configuration, hence requiring the teachings of JP 61-016817 to function as described.

Further regarding claims 26 and 31-37 and in regard to claims 52-54, Johnson ('251) teaches melting of the wax material from the resulting fiber reinforced composite (see col. 8, line 15-25). JP 61-016817 teaches that the melting temperature of the wax is 63 ^{O}C, and that the wax is pressed into a shape at a temperature somewhat below its melt temperature (40-80%). It is submitted that the temperature of the wax core during the resin injection step must be within the pressing temperature and within ±6 ^{O}C of the pressing temperature in view of the teaching in the JP 61-016817 reference that the pressing temperature encompasses a wide range of temperatures below the melt temperature and in view of Johnson's ('251) teaching that the mold is typically heated (carried out at elevated temperatures, 2:3-4) in order to reduce the cure time. Further, it is submitted that the actual temperature is a result-effective variable because, if the heating temperature of the wax core during the resin injection step is too high then the wax core will melt prior to curing of the resin and if it's too low then curing will not occur, hence resulting in a defective product. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). It is submitted that such a calculation is in the realm of one ordinarily skilled. Therefore, it would have been obvious for one of ordinary skill in the art to have used routine experimentation to determine an optimum heating temperature (±6 ^{O}C) in the process of Johnson ('251) in view of JP 61-016817 because, Johnson ('251) teaches molding at elevated temperatures (2:3-4) and melting of the wax material from the resulting fiber reinforced composite, hence teaching that if the heating temperature of the wax core during the resin injection step is too high then the wax core will melt prior to curing of the resin and if it's too low then curing will not occur, as such teaching that the heating temperature is a result-effective variable.

In regard to claims 45-48, JP 61-016817 teaches a two-part compression mold in which the top and bottom molds are brought together to mold said wax core (see Figures) from a preform. Therefore, it would have been obvious for one of ordinary skill in the art to have used a two-part compression mold for compression molding (plastic deformation) of a wax preform as taught by JP 61-016817 to form the solid wax core in the process of Johnson ('251) because, JP 61-016817 teaches that compression molding provides for an improved product by avoiding shrinkage and also because, Johnson ('251) teaches forming a wax core having a desired configuration.

Regarding claims 63-66, Johnson ('251) teaches glass fibers and epoxy resin (col. 8, lines 64-67 and col. 9, lines 13-18). It is submitted that an epoxy resin cures at about 80°C and is injected at about 60°C in order to avoid premature curing. Further, JP 61-016817 teach a melting temperature of about 63°C, hence requiring such a heating temperature to remove the core from the molded product obtained by the process of Johnson ('251) in view of JP 61-016817.

3. Claims 38-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 5,045,251) in view of JP 61-016817 and in further view of Vandas (US Patent No. 4,246,884).

Johnson ('251) in view of JP 61-016817 teaches the basic claimed process as described above.

Regarding claims 38-44, although Johnson ('251) in view of JP 61-016817 teaches a wax material, Johnson ('251) in view of JP 61-016817 do not teach a wax material having a melting temperature of at least 75, 85 or 90 ^{O}C and at most 110, 120 or 130 ^{O}C. Vandas ('884) teaches forming a wax article by compression molding (plastic deformation) a core mass (see col. 7,

lines 2-10 and 20-30), wherein said wax material has a melting temperature of less than 215 °F (115 °C). Therefore, it would have been obvious for one of ordinary skill in the art to have used the wax material of Vandas ('884) to mold the wax core in the resin transfer molding process of Johnson ('251) in view of JP 61-016817 because of known advantages that a higher melting temperature core provides in a resin transfer molding process such as the ability to use a higher temperature curing resin, thereby providing for an improved product having a higher resistance to temperature stresses.

4. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 5,045,251) in view of JP 61-016817 and in further view of JP 07-314477.

Johnson ('251) in view of JP 61-016817 teaches the basic claimed process as described above.

Regarding claims 49, Johnson ('251) in view of JP 61-016817 does not teach a resin trap channel to remove excess resin and gas. However, the use of trap channels to remove excess resin and gas in a molding process are well known as evidenced by JP 07-314477 which teaches the use of a trap channel (4) connected to a pin hole (3) and to mold cavity (2) (see Figure). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a trap channel as taught by JP 07-314477 in the process of Johnson ('251) in view of JP 61-016817 because, JP 07-314477 specifically teaches that trap channels avoids the formation of flash, hence improving product aesthetics.

5. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 5,045,251) in view of JP 61-016817 and in further view of Holtzberg (US Patent No. 6,344160 B1).

Johnson ('251) in view of JP 61-016817 teaches the basic claimed process as described above.

Regarding claim 50, although Johnson ('251) teaches melting of the wax core, Johnson ('251) in view of JP 61-016817 does not teach reusing the molten wax to make another, new preform core. Holtzberg ('160) teaches a lost wax core process including recycling the molten wax to form new cores (see col. 16, lines 59-61). Therefore, it would have been obvious for one of ordinary skill in the art to have recycled the molten wax as taught by Holtzberg ('160) in the process of Johnson ('251) in view of JP 61-016817 due to a variety of known advantages that recycling provides such as reduced costs, reduced waste, etc.

6. Claim 55-59 rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 5,045,251) in view of JP 61-016817 and in further view of Jones ('116).

Johnson ('251) in view of JP 61-016817 teaches the basic claimed process as described above.

Regarding claim 55, although Johnson ('251) in view of JP 61-016817 teaches heating a wax core, Johnson ('251) in view of JP 61-016817 does not specifically teach that said wax core expands. Jones ('116) teaches a molding process for making a hollow fiber composite structure including, providing a wax core, wrapping said wax core with resin impregnated fiber to form a wrapped assembly, heating said wrapped assembly such that said core expands and applies pressure onto said fiber and melting said core to form said hollow fiber composite structure (see col. 2, lines 55-61 and col. 3, lines 14-39). It is submitted that expansion occurs by more than 0%. Therefore, it would have been obvious for one of ordinary skill in the art to have allowed the wax core to expand as taught by Jones ('116) in the process of Johnson ('251) in view of JP 61-

016817 because, Jones ('116) teaches that such expansion provides a pressure onto the fiber layer that removes excess resin, hence providing for an improved molded article.

Further in regard to claim 55 and in regard to claims 56-59, Johnson ('251) teaches melting of the wax material from the resulting fiber reinforced composite (see col. 8, line 15-25). Further, Jones ('116) teaches heating said wrapped assembly such that said core expands and applies pressure onto said fiber and melting said core to form said hollow fiber composite structure (see col. 2, lines 55-61 and col. 3, lines 14-39). JP 61-016817 teaches that the melting temperature of the wax is 63 ^{O}C. Therefore, it is submitted that the heating temperature of the wax core during the resin injection step must within the melting range of the wax core and as such must be about 63 ^{O}C. Further, it is submitted that the actual temperature is a result-effective variable because, if the heating temperature of the wax core during the resin injection step is too high then the wax core will melt prior to curing of the resin and if it's too low then expansion and curing will not occur, hence resulting in a defective product. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Therefore, it would have been obvious for one of ordinary skill in the art to have used routine experimentation to determine an optimum heating temperature in the process of Johnson ('251) in view of JP 61-016817 and in further view of Jones ('116) because, Johnson ('251) teaches melting of the wax material from the resulting fiber reinforced composite, hence teaching that if the heating temperature of the wax core during the resin injection step is too high then the wax core will melt prior to curing of the resin and if it's too low then expansion and curing will not occur, and as such teaching that the heating temperature is a result-effective variable.

7. Claims 60-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 5,045,251) in view of JP 61-016817 and in further view of Jones ('116) and Daskivich (US Patent No. 3,811,903).

Johnson ('251) in view of JP 61-016817 and in further view of Jones ('116) teaches the basic claimed process as described above.

Regarding claims 60-62, although Jones ('116) teaches thermal expansion of a wax core material, Johnson ('251) in view of JP 61-016817 and in further view of Jones ('116) do not teach a specific volumetric expansion. However, it is well known that materials used in a lost core process expand within the range of 1-5% as evidenced by Daskivich ('903) which teaches a specific wax based material used in a lost core molding process having a volumetric expansion of less than 5% when heated from 70-220°F (see col. 3, lines 19-40). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a wax material having a volumetric expansion of less than 5% when heated from 70-220°F as taught by Daskivich ('903) in the process of Johnson ('251) in view of JP 61-016817 and in further view of Jones ('116) because, Daskivich ('903) specifically teaches that wax based material that is used in a lost core molding process has a volumetric expansion of less than 5% when heated from 70-220°F, whereas the process of Johnson ('251) in view of JP 61-016817 and in further view of Jones ('116) requires a wax material that is heated within the range of 185-240°F to function as described and also because of its well known status as evidenced by Daskivich ('903).

Response to Arguments

8. Applicant's arguments filed 15 February 2007 have been fully considered but they are not persuasive. The arguments appear to be on the following grounds:

a) Johnson is silent to the temperature maintained during the molding process and the temperature of the core. There is no teaching of using a fibre preform as now recited.

b) JP 61-016817 is silent to the use of a solidified wax body once it is shaped, and there is no mention of its temperature during forming.

9. These arguments are not persuasive for the following reasons:

a and b) Johnson teaches that it is typical that the molding process may be carried out at elevated temperatures in order to reduce cure time (2:3-4) and that the resin is typically heated before injection (7:24-26) into the mold. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention that the elevated temperature of the mold and the heated resin must adjusted to be below the melt temperature of the wax in order to cause molding and subsequent removal of the core (8:14-25), but so as to also provide the desired benefit of reducing curing time (by performing the molding process at elevated temperatures). Thus, the particular temperature of the mold and core during injection represents an optimizable quantity and the desired effects are to reduce curing time (by using elevated temperature molds or resins) but maintenance of a solid wax core. JP 61-016817 discloses that the wax has a melt temperature of 63 C, and that the wax is heated and formed at a temperature below its melt temperature, but encompassing a wide temperature range of 40% to 80% of the melting point. Thus, because the resin injection and mold temperature must occur below the melt temperature

of the wax core, and because the shaping temperatures constitute a wide temperature range below the melting temperature of the core, it is submitted that the average temperature of the core during deformation and the average temperature of the cure during injecting of the plastic would have been substantially equal and within +/- 6 degrees C.

With regard to the fiber preform, Johnson explicitly teaches a preform (4:59-68 and elsewhere), and it is submitted that the manufacturing of the preform is implicit in that a preform is provided.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Daniels whose telephone number is (571) 272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MJD 5/29/07

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5/29/07